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THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of: SHERIF *et al.*	:	Examiner: MELESS ZEWDU
Serial No.: 09/503,990	:	Group Art Unit: 2683
Filed: February 14, 2000	:	Date: August 18, 2004
For: Mobile To Mobile Digital Wireless Connection Having Enhanced Voice Quality	:	Atty Dkt No.: Sherif 2-7

TO: **HONORABLE COMMISSIONER FOR PATENTS**
ALEXANDRIA, VA 22313

BRIEF OF APPELLANT

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BRIEF OF APPELLANT

This is an appeal from the final Rejection of the Examiner dated February 18, 2004 rejecting Claims 1-2, 9-11 and 15. This Brief is accompanied by the requisite fees set forth in Section 1.17 of the Regulations.

REAL PARTY IN INTEREST

The application is assigned to Lucent Technologies, Inc.

RELATED APPEALS AND INTERFERENCES

None

STATUS OF CLAIMS

This application was filed as an original application on February 14, 2000, containing 15 claims, of which two were independent claims (Claims 1 and 9).

Claims 1, 2, 9-11 and 15 were rejected by an Office Action dated February 14, 2003. Dependent claims 3-8 and 12-14 were objected to in that action as being dependent upon a rejected base claim.

Applicants sought reconsideration of that rejection by a Response to Office Action filed on June 14, 2003, which argued that the art of record did not support the Examiner's 35 U.S.C. §103 claim rejections. No claims were amended in that response.

In the next Office Action dated September 10, 2003, which was a non-final action, claims 1, 2, 9-11 and 15 were again rejected 35 U.S.C. §103, based on the same primary reference as applied in the February 14, 2003 Office Action and a newly-cited secondary reference. Dependent claims 3-8 and 12-14 were again objected to as being dependent upon a rejected base claim.

Applicants sought reconsideration of the claim rejections in the September 10, 2003 Office Action by a Response to Office Action filed on December 10, 2003. In that response, Applicants amended claims 1 and 9-15 and argued that claims as amended were patentable over the art of record.

In a Final Office Action dated February 18, 2004, claims 1, 2, 9-11 and 15 were again rejected 35 U.S.C. §103, the Examiner maintaining the rejection basis of the prior Office Action. Dependent claims 3-8 and 12-14 were again objected to as being dependent upon a rejected base claim.

On May 18, 2004 Applicants filed their Notice of Appeal herein in response to the February 18, 2004 Final Office Action.

On July 14, 2004, a telephone interview was conducted between Applicant's counsel and the Examiner to explore possible claim amendments that might lead to an allowance and render the appeal moot. That interview was not successful.

The status of claims as set out in the February 18, 2004 Final Office Action was, and is as follows:

Allowed Claims: None

Claims Rejected, and Appealed herein: 1-2, 9-11 and 15

STATUS OF AMENDMENTS

Applicants' claim amendments filed December 10, 2003 have been entered and the claims in the case, as set out in Appendix A, include those amendments.

SUMMARY OF THE INVENTION

Wireless telephone communication systems utilize encoding to limit the amount of bandwidth required to transmit voice information over a communication channel. That encoding is typically carried out by a voice coder, which is usually referred to as a vocoder. In a digital wireless network, a vocoder operated at the transmitter models the voice signal using a specific mathematical model and generates a set of parameters that best describes the voice signal for a given interval interval. At the receiver, the encoded signal from the vocoder is operated on by a decoder to recover the original voice signal.

The audio path from a mobile station of a wireless network to a desktop phone consists of a voice encoder at the mobile station, a wireless transmitter at the mobile station, a wireless receiver at the base station, and a decoder at the base station. Thus there is one voice encoder and

one decoder involved in the processing of the audio signal. This process is referred to as being a single vocoding operation because it involves a single encoding/decoding process.

On the other hand, for a call from a first mobile station to a second mobile station, The audio path includes a voice encoder at the first mobile station, and a voice decoder at the base station (receiver) followed by a second voice encoder at the base station (or at another base station), and then to a wireless receiver at the second mobile station where the encoded voice signal is processed by in a second decoder to generate the voice signal. Thus, when a call is made from one mobile station to another mobile station, the voice signal is processed by two voice encoders and two decoders. This process is referred to as tandem vocoding because the voice signal is encoded twice and decoded twice.

The processing of the voice signal by the vocoding process (the process of encoding and decoding the voice signal) introduces a certain amount of digital distortion into the voice generated at the receiver relative to the actual voice uttered by the speaker. While the quality of the voice generated by the decoder in single vocoding processing is regarded as acceptable, it is somewhat below the voice quality of the input speech. Tandem vocoding compounds the digital distortion introduced into the voice signal and materially degrades the perceived voice quality at the end receiver.

The invention provides an improvement in the voice quality experienced in a tandem vocoder processing operation by modifying the spectrum of the voice signal before it is processed by the second vocoder to compensate for digital distortion which is generated by the second vocoder. As described by the Applicants, that modification of the voice signal spectrum is preferably carried out by interposing an adaptive filter in a tandemed encoder/decoder application between the output of the first decoder and the input of the

following encoder (Specification, page 6, lines 6-12). The adaptive filter of the invention operates to provide a spectral adjustment to the output of the first decoder, which adjustment substantially compensates for spectral distortion introduced by the encoding/decoding process.

As the Applicants further describe in the application, the spectral distortion resulting from tandem vocoder processing is concentrated at the upper frequencies of the voice band, but remains significant in lower portions of the voice spectrum. Accordingly, while the spectral adjustment carried out by the invention is also concentrated at the higher voice frequencies, the Applicants make clear that some lesser adjustment may also be usefully applied over substantially the entire remaining voice spectrum (Specification, page 6, lines 19-26). Indeed, reference to Figure 8, depicting the frequency response of an illustrative adaptive filter applied according to the invention, shows just such a case. As shown in the figure, there is a concentration of the filter gain (spectral adjustment) in the portion of the spectrum between 3000 and 4000 Hz. However, as also shown in the figure, the filter gain continues, at a lesser magnitude, from 3000 Hz down to near 0 Hz.

The critical element of Applicants' independent claims that is addressed to the previously described functionality of the invention, can be summarized as:

an adaptive filter coupled to the output of a speech decoder and adapted to modify the spectrum of the voice signal from the speech decoder so as to substantially compensate for spectral distortion introduced by an encoding and decoding of the voice signal.

ISSUES

The Examiner has rejected Applicants' independent claims, and certain identified dependent claims, under 35 U.S.C. §103 on the ground that the claimed invention is not

patentable over a combination of two cited references. That is the sole stated basis for rejection in the February 18, 2004 Final Office Action. Accordingly, the sole issue in this appeal is that of whether the cited references can properly be combined pursuant to §103 in a manner to render Applicants' claimed invention patentably indistinct therefrom.

GROUPING OF CLAIMS

All of the rejected claims stand together as a single group.

ARGUMENT

All of the rejected claims in this appeal were rejected as being unpatentable, under 35 USC §103, over a combination of two cited references. Under §103, a claimed invention is deemed unpatentable "if the differences between [it] and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art." It is well settled that, when a rejection depends on a combination of prior art references, there must be some teaching, suggestion, or motivation to combine the references. *See in re Geiger*, 815 F.2d 686,688 (Fed. Cir. 1987). A clear corollary of that principle is that a combination so made would in fact substantially replicate the function and structure of the claimed invention.

The discussion of the "obviousness" standard by the Federal Circuit in *In re Rouffet*, 149 F.3d 1350, 1357 (1998), is instructive in regard to the issue of combining references for an obviousness determination under §103. There the court stated:

> Virtually all inventions are combinations of old elements [*citations omitted*]. Therefore an examiner may often find every element of a claimed invention in the prior art. If identification of each claimed element in the prior art were sufficient to negate patentability, very few patents would ever issue. Furthermore, rejecting

> patents solely by finding prior art corollaries for the claimed elements would permit an examiner to use the claimed invention itself as a blueprint for piecing together elements in the prior art to defeat the patentability of the claimed invention. Such an approach would be an illogical and inappropriate process by which to determine patentability.
>
> To prevent the use of hindsight based on the invention to defeat patentability out the invention, this court requires the examiner to show a motivation to combine the references that create the case of obviousness. In other words, the examiner must show reasons that the skilled artisan, confronted with the same problems as the inventor and with no knowledge out of claimed invention, would select the elements from the cited prior art references for combination in the manner claimed.

As will be shown hereafter, not only has the Examiner failed to meet his obligation to show a motivation for combining the cited references in the manner suggested, the suggested combinations themselves fail to rise to the level of showing or suggesting Applicants' claimed invention.

In the Final Office Action, independent claims claims 1 and 9, along with dependent claims 2, 10-11 and 15 were rejected under 35 USC §103(a) as being unpatentable over Weaver, Jr. (U.S. Patent No. 5,903,862) in view of Haykin, *Adaptive Filter Theory*.

That combination was applied in the following manner. First, with respect to independent claim 1, is suggested that Weaver teaches the limitations of:

> *receiving a first encoded voice signal as a first set of voice signal parameters*
>
> *directing the first set of voice signal parameters to a first speech decoder to generate a voice signal*
>
> *transmitting the second set of voice signal parameters.*

The Office Action goes on to suggest that Weaver further discloses that one of the primary reasons that tandem vocoders produce degraded quality audio signals is that modern vocoders used postfilters at the output of the speech decoding process, and suggests that Weaver discloses a modification of that postfilter to make the frequency response of the filter more gentle. At that point, the Office Action acknowledges that Weaver does not teach the limitation of claim 1 respecting: *feeding the voice signal from the first speech decoder to an adaptive filter to produce a modified voice signal, the adaptive filter being operative to modify the spectrum of the voice signal from the first speech decoder so as to substantially compensate for spectral distortion introduced by an encoding and decoding of the voice signal.*

To address that deficiency in the teaching of its primary reference, the Office Action states that the secondary reference, Haykin, teaches that "[t]he ability of adaptive filter to operate satisfactorily in an unknown environment and track time variations of input statistics make the adaptive filter a powerful device for signal processing and control applications." The Office Action also refers to a statement in Haykin that "an input vector and a desired response are used to compute an estimation error, which is in turn used to control the values of a set of adjustable filter coefficients." The Examiner then reasons that the Haykin teaching regarding use of adaptive filter in an "unknown environment" could include the environment between vocoders of a transmitter and a receiver, for controlling an output signal using the input and a desired response to compute an estimation error by which values of the adaptive filter coefficients are adjusted. Therefore, concludes the Office Action, it would have been obvious for one of ordinary skill in the art to replace Weaver's modified filter with Haykin's adaptive filter for the advantage of adaptively canceling noise and/or echo in a communication system.

According to the Office Action, a corresponding analysis would also be applied for independent claim 9.

Applicants respectfully disagree that the suggested combination of Weaver and Haykin could be applied to render the claimed invention obvious. Although the Weaver reference provides a general teaching in respect to tandemed encoder/decoder operations, and is particularly directed to a method for detecting the occurrence of such tandemed operations, it does not provide any teaching that could reasonably be construed to show or suggest the introduction of an adaptive filter between the first decoder and the following encoder, as acknowledged by the Office Action. It is noteworthy that this introduction of an adaptive filter in a tandem vocoder operation and the spectral adjustment carried out by that adaptive filter is viewed by the Applicants as the key point of novelty for their invention. Thus one may question the merit of a primary §103 reference that is conceded by the Office as not teaching such an essential feature.

While the Office Action suggests that the limitation directed to the adaptive filter and corresponding spectral feature of the invention is taught by the secondary reference, Haykin, Applicants note that Haykin is simply an academic treatise directed to a teaching of adaptive filter principles generally – primarily an exploration of the mathematical principles underlying operation of adaptive filters, with a limited discussion of the application of such filters. Plainly, nothing in the teaching of Haykin shows, or could reasonably be construed to suggest the use of an adaptive filter for making a spectral adjustment to the output of a decoder. Even more, there is certainly no teaching in Haykin which might suggest the application of such an adaptive filter to effect a spectral correction in a tandemed encoder/decoder arrangement.

As noted above, the Office Action cites a statement in Haykin that "an adaptive filter [can] operate satisfactorily in an unknown environment" and goes on to suggest that one skilled in the art, with a general understanding of tandemed encoder/decoder applications (such as taught by Weaver), would apply this "unknown environment" teaching of Haykin to devise the method of Applicants' invention for using an adaptive filter to correct spectral errors occurring in such an tandemed encoder/decoder application. Applicants respectfully submit that such a leap from a general statement that adaptive filters can operate in "unknown environments" to the specific filter application incorporated in Applicants invention (and in the absence of any teaching whatsoever in Haykin related to tandemed encoder/decoder applications) could only occur through the prohibited use of the "hindsight" provided by the Applicant's disclosure as a basis for interpreting the teaching of the prior art. (See *In re Rouffet, ibid*).

Moreover, while Applicants believe that the cited references fail even to provide a teaching that could lead one skilled in the art to the invention here, the rejection is also devoid of another critical factor. As a corollary to the prohibition on "hindsight" analysis, the courts have made clear that a §103 obviousness rejection must include a showing of a motivation in the applied reference to use the teaching of that reference (or a combination of references) in a manner to replicate the claimed invention. (*Rouffet , id*).

Simply put, there is no teaching in the Weaver reference that could be read to suggest a modification of a tandemed encoder/decoder combination to add an adaptive filter for the purpose of correcting a spectral distortion inherent in such a combination. Likewise, there is no teaching in Haykin that could be read to suggest an application of an adaptive filter for spectral correction in a tandemed encoder/decoder combination. The Examiner has not

articulated any other basis for that skilled artisan to select the asserted combination of elements from those references to solve the problem addressed by the inventors. Accordingly, Applicants respectfully submit one skilled in the art would have found no motivation for combining those references in the manner suggested by the Office Action, and thus that the §103 rejection must fail.

In sum, there is no teaching in Weaver or Haykin, or a combination thereof, which can realistically be read to show or suggest the novel features of Applicants' invention. Moreover, other than the bare assertion in the Office Action that a combination of the teaching of those references could be made which would replicate the structure and function of the invention, there is no meaningful support for that position. Applicants respectfully submit that no feasible combination of those references would in fact produce the structure and function of the invention.

As with the consideration of the claim 1 rejection above, there is no teaching in Weaver or Haykin, or a combination thereof, which can realistically be read to show or suggest the novel features of independent claim 9. Moreover, Applicants respectfully submit that no feasible combination of those references would in fact produce the structure and function of the claimed invention. And, also like the rejection of claim 1, no motivation is to be found in any of the cited references for making such a combination and no independent basis for finding such motivation has been suggested by the Office Action.

In light of the analysis hereinabove, Applicants respectfully suggest that the Examiner has misapplied the cited references as providing teachings from which Applicants' invention (as set forth in independent claims 1 and 9) could be derived as an obvious combination.

Dependent claims 2, 10-11 and 15 include all of the essential limitations of claim 1 or claim 9. Inasmuch as claims 1 and 9 have already been shown to be patentable over the cited

references, dependent claims 2, 10-11 and 15, which were rejected as being unpatentable over the same combination of references must also be found patentable over those references.

One final point in respect to the telephone interview reference above, which was conducted to explore the possibility of reaching an allowance and thereby mooting the further conduct of this appeal. Although the interview was ultimately unsuccessful in meeting that objective, the Applicants believe that it clarified the essential difference between their position and that of the Examiner. That difference can be described as the issue of whether the limitation of the independent claims directed to the operation of the adaptive filter should include a lower limit (*e.g.* 300 Hz), on the frequency gain adjustment carried out by that filter. In Applicants view, nothing in the teaching of the prior art would require such a lower frequency limitation, and Applicants disclosure provides support for applying such a frequency gain adjustment substantially throughout the voice frequency spectrum. On the other hand, the Examiner indicated a disposition to allow the application upon the addition of such a limitation to the independent claims. After due consideration of the Examiner's position in that regard, the Applicants determined to continue the appeal in the belief that there claims will ultimately be allowed without such a limitation.

Appellant therefore respectfully requests that the Board reverse the Examiner as to the issue of whether Applicants' claimed invention is patentable under §103 over the references cited by the Examiner.

Respectfully submitted,

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I hereby certify that this Brief of Appellant is being deposited with the United States Postal Service as First Class Mail, postage prepaid, in an envelope addressed to the Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313 on August 18, 2004.

By: _____
John A. Ligon

APPENDIX

CLAIMS IN CASE

The Claims

1. (Previously Presented) A method for communicating characterized by the step of:

receiving a first encoded voice signal as a first set of voice signal parameters;

directing the first set of voice signal parameters to a first speech decoder to generate a voice signal;

feeding the voice signal from the first speech decoder to an adaptive filter to produce a modified voice signal, the adaptive filter being operative to modify the spectrum of the voice signal from the first speech decoder so as to substantially compensate for spectral distortion introduced by an encoding and decoding of the voice signal;

feeding the modified voice signal to a speech encoder to convert the modified voice signal into an encoded modified voice signal represented by a second set of voice signal parameters; and

transmitting the second set of voice signal parameters.

2. (Original) The method of claim 1 further comprising the step of:

modifying the spectrum of the voice signal from the first speech decoder using the adaptive filter which compensates for digital distortion which will occur when the encoded modified voice signal represented by the second set of voice signal parameters is decoded.

3. (Original) The method of claim 1 wherein:

the dB of frequencies above 2400 Hz of the modified voice signal have increased magnitude of from 0 to 10 dB.

4. (Original) The method of claim 1 wherein:

the dB of frequencies below 2400 Hz of the modified voice signal have increased magnitude of from 0 to 6 dB.

5. (Original) The method of claim 1 wherein:

the dB of frequencies above 2000 Hz of the modified voice signal have increased magnitude of from 2 to 8 dB.

6. (Original) The method of claim 1 wherein:

the dB of frequencies between 1500 Hz and 2400 Hz of the modified voice signal have increased magnitude of from 0 to 2 dB.

7. (Original) The method of claim 1 wherein:

the dB of frequencies between 2400 Hz and 2850 Hz, and those that are between 3150 Hz and 4000 Hz of the modified voice signal have increased magnitude of from 4 to 8 dB.

8. (Original) The method of claim 1 wherein:

the dB of frequencies between 2850 Hz and 3150 Hz of the modified voice signal have increased magnitude of from 7 to 11 dB.

9. (Previously Presented) A wireless call connection characterized by:

a speech decoder coupled to a wireless receiver for receiving a signal made up of a set of parameters represented of a voice signal and for converting the received signal to a voice signal;

an adaptive filter coupled to receive the voice signal from the speech decoder to produce a modified voice signal which, when encoded, will produce a second signal made up of another set of parameters representative of the voice signal, the adaptive filter being operative to modify the spectrum of the voice signal from the speech decoder so as to substantially compensate for spectral distortion introduced by an encoding and decoding of the voice signal.

10 (Previously Presented) The wireless call connection of claim 9 wherein the adaptive filter modifies the magnitude of selective frequencies of the spectrum of the voice signal from the decoder.

11. (Previously Presented) The wireless call connection of claim 10 wherein the adaptive filter modifies the magnitude of selective frequencies of the spectrum of the voice signal from the decoder to compensate for digital distortion caused by encoding and decoding the modified voice signal.

12. (Previously Presented) The wireless call connection of claim 10 wherein the adaptive filter increases the dB of frequencies above 3000 Hz of the voice signal from the decoder to compensate for digital distortion caused by encoding and decoding the modified voice signal from the adaptive filter.

13. (Previously Presented) The wireless call connection of claim 10 wherein the adaptive filter increases the dB of frequencies above 1500 Hz of the voice signal from the decoder to compensate for digital distortion caused by encoding and decoding the modified voice signal from the adaptive filter.

14. (Previously Presented) The wireless call connection of claim 10 wherein the adaptive filter increases the dB of frequencies above 300 Hz of the voice signal from the decoder to compensate for digital distortion caused by encoding and decoding the modified voice signal from the adaptive filter.

15. (Previously Presented) The wireless call connection of claim 9 wherein the adaptive filter increases the dB of selective frequencies of the spectrum of the voice signal from the decoder to cause the spectrum of a voice signal generated by subsequent encoding and decoding of the modified signal to be close to that of the voice signal from the speech decoder.